

MEDICAL DATA ARCHITECTURE PLATFORM AND RECOMMENDED REQUIREMENTS FOR A MEDICAL DATA SYSTEM FOR EXPLORATION MISSIONS

M. Krihak¹, B. Schmitt², J. Noel², S. Winther², W. Toscano³, J. Bardina³, S. Shetye³ and T. Shaw³

¹Universities Space Research Association, Mountain View, CA

²KBR Inc, Mountain View, CA

³NASA Ames Research Center, Moffett Field, CA

ABSTRACT

The Medical Data Architecture (MDA) project supports the Exploration Medical Capability (ExMC) risk to minimize or reduce the risk of adverse health outcomes and decrements in performance due to in-flight medical capabilities on human exploration missions. To mitigate this risk, the ExMC MDA project addresses the technical limitations identified in ExMC Gap Med 07: We do not have the capability to comprehensively process medically-relevant information to support medical operations during exploration missions. This gap identifies that the current in-flight medical data management includes a combination of data collection and distribution methods that are minimally integrated with on-board medical devices and systems. Furthermore, there are a variety of data sources and methods of data collection. For an exploration mission, the seamless management of such data will enable a more medically autonomous crew than the current paradigm of medical data management on the International Space Station. ExMC has recognized that in order to make informed decisions about a medical data architecture framework, current methods for medical data management must not only be understood, but an architecture must also be identified that provides the crew with actionable insight to medical conditions. This medical data architecture will provide the necessary functionality to address the challenges of executing a self-contained medical system that approaches crew health care delivery without assistance from ground support. Hence, the products derived from the third MDA prototype development will directly inform exploration medical system requirements for Level of Care IV in Gateway missions.

In fiscal year 2019, the MDA project developed Test Bed 3, the third iteration in a series of prototypes, that featured integrations with cognition tool data, ultrasound image analytics and core Flight Software (cFS). Maintaining a layered architecture design, the framework implemented a plug-in, modular approach in the integration of these external data sources. An early version of MDA Test Bed 3 software was deployed and operated in a simulated analog environment that was part of the Next Space Technologies for Exploration Partnerships (NextSTEP) Gateway tests of multiple habitat prototypes. In addition, the MDA team participated in the Gateway Test and Verification Demonstration, where the MDA cFS applications was integrated with Gateway-in-a-Box software to send and receive medically relevant data over a simulated vehicle network. This software demonstration was given to ExMC and Gateway Program stakeholders at the NASA Johnson Space Center Integrated Power, Avionics and Software (iPAS) facility. Also, the integrated prototypes served as a vehicle to provide Level 5 requirements for the Crew Health and Performance Habitat Data System for Gateway Missions (Medical Level of Care IV). In the upcoming fiscal year, the MDA project will continue to provide systems engineering and vertical prototypes to refine requirements for medical Level of Care IV and inform requirements for Level of Care V.